

SMALL PURPLE PEA

SWAINSONA RECTA
ACTION PLAN



PREAMBLE

The Small Purple Pea (*Swainsona recta*, A.T. Lee 1948) was declared an endangered species on 15 April 1996 (Instrument No. DI1996-29 under the *Nature Conservation Act 1980*). Under section 101 of the Nature Conservation Act 2014, the Conservator of Flora and Fauna is responsible for preparing a draft action plan for listed species. The first action plan for this species was prepared in 1998 (ACT Government 1998). This revised edition supersedes the earlier edition.

Measures proposed in this action plan complement those proposed in the action plans for Yellow Box-Blakely's Red Gum Grassy Woodland, Natural Temperate Grassland and component threatened species such as the Tarengo Leek Orchid, Brown Treecreeper and Canberra Spider Orchid.

CONSERVATION STATUS

The Small Purple Pea is declared a threatened species in line with the following legislation:

- **National:** *Environment Protection and Biodiversity Conservation Act 1999* (Endangered).
- **Australian Capital Territory:** *Nature Conservation Act 2014* (Endangered) and *Nature Conservation Act 2014* (Special Protection Status Species)
- **New South Wales:** *Biodiversity Conservation Act 2016* (Endangered)
- **Victoria:** *Flora and Fauna Guarantee Act 1988* (Threatened)

CONSERVATION OBJECTIVES

The objective of this action plan is to preserve the Small Purple Pea in perpetuity in the wild across its natural geographic range in the ACT and contribute to the regional and national conservation of the species.

Specific objectives of the action plan are to:

- protect sites where the species is known to occur in the ACT from unintended impacts
- manage the species and its habitat to maintain the potential for evolutionary development in the wild
- improve the long-term viability of populations through management of adjacent woodland to increase habitat area

- expand the range of the species in the ACT by identifying suitable habitat and establishing new populations by translocation
- improve the understanding of the species' ecology, habitat and threats
- strengthen stakeholder and community collaboration in the conservation of the species.

SPECIES DESCRIPTION AND ECOLOGY

DESCRIPTION

The Small Purple Pea is a slender, erect perennial plant that produces several rigid stems 20-30 cm high. It has a thick taproot that can extend at least 60 cm below the soil surface (NSW OEH 2012). The leaves of the species are odd pinnate, they are composed of 7-11 narrow leaflets, 5-7cm long. The terminal leaflet is distinctly longer than adjacent laterals. The species produces 10-21 racemes (that range from 10-27cm long), which bear purple or blue-purple flowers that are 5-6mm long. Individual flowers are borne on short recurved stalks, 0.1-0.3 cm long; they have two distinct white spots or short stripes on the base of the standard (central) petal (NSW OEH 2012). The pods are rounded-oblong (7-11 mm long and 4-6 mm wide) and are hairless except along the suture and base. Pods contain several small, hard-coated kidney shaped seeds that are approximately 2 mm long (Briggs and Leigh 1990, Leigh and Briggs 1992).

DISTRIBUTION

In the past, the Small Purple Pea was relatively widespread; it has been recorded in north-eastern Victoria and the South and Central Western Slopes and Tablelands of NSW. Over the past 80 years the known range of the species has declined considerably; its distribution is now fragmented into two clusters of populations, one in central eastern NSW (between Wellington and Mudgee) and the other in the Canberra – Williamsdale district. Young (2001) found a moderate genetic difference between the populations in the central eastern NSW region and those in the ACT. A single plant was found near Glenrowan, Victoria in 1995 but has since died (NSW OEH 2012).

In 1996, the largest known population comprised approximately 3,400 plants; these plants continue to persist along 22 km of railway easement from Tralee to Williamsdale along the ACT/NSW border (Briggs 1994, Briggs and Müller 1997). In 2010 a large population of more than 1,000 plants was discovered nearby, on private land in the Williamsdale area. Another population of 4,200 plants was discovered on Mount Arthur near Wellington in 2011. This discovery increased the local population to 4,576 individuals. Other sites in NSW where the species survives includes Burrendong (160 plants), Mudgee (270 plants), Burra (100 plants), Mandurama (10 plants) and Guises Creek (50 plants) (Briggs and Leigh 1990, NSW OEH 2012). The total known population in NSW is approximately 9,270 plants.

At Mt Taylor in the ACT, over 400 individual plants have been recorded since monitoring began at the site; the highest annual count of emergent plants is 268. While recruitment of new individuals to the population each year is low, the total population at Mt Taylor is considered to be stable.

A small population of the species persists in the suburb of Kambah. Twenty one plants have been recorded since monitoring began at the site; the highest annual count of emergent plants is 10. This isolated population has been fenced to protect it from unintended disturbance. No recruitment has been observed in this population. In October 2003 another population (several plants) was located in Yellow Box-Blakely's Red Gum grassy woodland in south-east Belconnen, near Gungahlin Drive (Caswell Drive).

In 2012 and 2013, 112 plants raised at the Australian National Botanic Gardens (ANBG) were translocated to 3 plots near the Gigerline Nature Reserve in the southern ACT (as part of the Icon Water Murrumbidgee to Googong Pipeline (M2G) offset project) (Eco Logical Australia 2017). The original seed for this project was sourced from three populations (Mt Taylor, Burra and Williamsdale). Approximately 32% of the translocated plants survived.

In the ACT region, the Small Purple Pea was previously recorded, but no longer persists, in the following locations: Queanbeyan, Black Mountain, O'Connor, Harman and Mawson. A single plant was recorded adjacent to Long Gully Road (Isaacs Ridge) but it has not been observed since 1995. Similarly, a single plant recorded in Farrer Ridge has not been observed in the last 10 years.

A map of the current distribution of this species is available on the ACT Government's mapping portal, ACTmapi.

HABITAT AND ECOLOGY

In the ACT region, the Small Purple Pea occurs on grey sandy or stony loams, on all aspects of undulating terrain (Briggs and Leigh 1990). It occurs in open woodland dominated by one or more of the following canopy species: Blakely's Red Gum (*Eucalyptus blakelyi*), Apple Box (*E. bridgesiana*), Yellow Box (*E. melliodora*), Mealy Bundy (*E. nortonii*), Long-leaved Box (*E. goniocalyx*) or Black Cypress Pine (*Callitris endlicheri*). The grassy understorey is dominated by Kangaroo Grass (*Themeda triandra*), Snow Grass (*Poa sieberiana* var. *sieberiana*), Red-Anther Wallaby grass (*Rytidosperma pallidum*) or Spear grasses (*Austrostipa* spp.) The groundcover also includes a wide range of native forbs; the most common species include Bulbine Lily (*Bulbine bulbosa*), Common Everlasting (*Chrysocephalum apiculatum*), Billy Buttons (*Leptorhynchos squamatus*), Common Raspwort (*Gonocarpus tetragynus*) and Pale Sundew (*Drosera peltata*). Occasionally the understorey may have a low shrub component that includes Curved Rice-flower (*Pimelea curviflora*), Bitter Cryptandra (*Cryptandra amara*), Daphne Heath (*Brachyloma daphnoides*) and Leafy Bitter-pea (*Daviesia mimosoides*) (NSW OEH 2012, NSW OEH 2017). Most ACT sites have a mid-storey shrub layer containing Australian Blackthorn (*Bursaria spinosa* subsp. *lasiophylla*), Sifton bush (*Cassinia quinquefaria*), Narrow leaved hopbush (*Dodonaea viscosa* subsp. *angustissima*), Native indigo (*Indigofera australis*) or Burgan (*Kunzea ericoides*).

The Small Purple Pea is a perennial forb that persists as woody rootstock throughout late summer and autumn. It re-sprouts between April and August and flowers during spring. Peak flowering occurs during a 2 – 3 week period in October. By the end of December, when seed is ripe, individuals enter dormancy once again (NSW OEH 2012). Insects are the primary means of pollination, and seed set is assumed to be influenced by annual climatic variation (NSW OEH 2012). Recent analysis of monitoring data from Mt Taylor suggests there is a relationship between the likelihood an individual will flower and the number of frost nights in the preceding year. A plant is most likely to flower when there are between 7 and 15 nights equal to or less than -4°C (Wilson et al. 2016). The life span of the Small Purple Pea is unknown. Individual plants have been monitored for over 30 years; it is estimated they may live up to 50 years (NSW OEH 2012).

Research and monitoring programs demonstrate that fire may enhance the recruitment of populations by facilitating and / or stimulating critical stages of its reproduction. Fire is believed to facilitate re-sprouting as it removes biomass that may otherwise overcrowd new shoots (Briggs and Müller 1999, NSW OEH 2012). This association appears weaker in less disturbed sites where groundcover density is limited by a mature overstorey and thus the species is subject to less competition. Fire may also stimulate seed germination (Briggs and Müller 1999, NSW OEH 2012), however no effect on the production of seed pods has been identified (Briggs and Müller 1999). Analysis by Wilson et al. (2016) indicated a linear decline in the proportion of flowering individuals with increasing time since fire.

Although re-sprouting has been observed from damaged rootstock, persistent grazing of annual shoots is likely to inhibit an individual's capacity to continue to re-sprout (NSW OEH 2012).

PREVIOUS AND CURRENT MANAGEMENT

MT TAYLOR

In 1996 the ACT Government commenced monitoring the population of Small Purple Pea at Mt Taylor. To better understand recruitment in the population, the ACT Government commenced tagging individual plants in 2001. Each year, previously unrecorded plants are tagged with a unique identification number (on a metal tag inserted into the ground).

In 2000 an ecological burn was carried out at the site. The number of flowering plants increased over the following two springs. However, as data was not collected systematically before the burn was conducted, the exact relationship between the fire and flowering success cannot be determined. A high intensity fire burnt the site during the 2003 Canberra Bushfires. Despite the severity of the burn, and ongoing drought conditions, the population of Small Purple Pea responded by producing new spring growth and flowering that year. The number of flowering plants recorded in 2003 was the highest on record at that time. After

2003, surveys of the Mt Taylor population were not undertaken until 2009. Annual surveys have been undertaken since this time.

Since 1991 the Mount Taylor Park Care group has undertaken a number of management activities within the reserve but outside the habitat area, including: the removal of woody weeds, planting native trees, shrubs and grasses, and erosion control. There is current evidence of grazing on individuals of the species at Mt Taylor (ACT Government 2015), however it is not possible to attribute this activity to specific vertebrate or invertebrate grazers without further research.

In 2015 the ACT Government partnered with the ANBG to further develop the seed bank for the Small Purple Pea (and various other rare flora species) from multiple in-situ populations. In 2016, a seed orchard of the Small Purple Pea was established at the ANBG to facilitate future translocations of the species by the ACT Government.

KAMBAH

The population in the suburb of Kambah was fenced during the 1980's to protect the population and habitat from grazing or inadvertent damage. In 1988 and 1989 twelve plants (raised from seed collected from the Tralee-Williamsdale railway easement in NSW) were translocated to the Kambah population to increase genetic variation and recruitment. Only three of these plantings were still alive in 2009. There has been no improvement in recruitment at the site.

To reduce the density of Kangaroo Grass (*Themeda triandra*) in the absence of grazing, ecological burns were conducted at the site in 2000, 2011 and 2013. Weed control has been undertaken at the Kambah site to remove Sweet Briar (*Rosa rubiginosa*), naturalised Prickly Spiderflower (*Grevillea juniperina*) and dense eucalypt regeneration. There is also current evidence of grazing on individuals of the species at Kambah (ACT Government 2015). The fence excludes both macropods and rabbits; however possums, birds and invertebrates can still access the area. Slug and snail bait has occasionally been laid at the site to control potential slug damage to Small Purple Pea plants.

CASWELL DRIVE

Until recent years, the population of Small Purple Pea near Caswell Drive was located on a rural lease. In addition to grazing pressures by kangaroos and rabbits, the site was subject to grazing by cattle and sheep. The site has now been incorporated into the ACT Nature Reserve System and is managed by the Parks and Conservation Service. The population has been inspected and monitored regularly since 2012; individual plants have been tagged since 2015. Translocation of plants from the ANBG to this site may be undertaken to improve genetic variation and recruitment.

THREATS

Urban development and agricultural practices have resulted in the loss, degradation and fragmentation of appropriate woodland habitat for the Small Purple Pea. As a result, populations of the species in the ACT are small and severely fragmented, and thus vulnerable to extinction as a result of stochastic events. Small populations are also subject to inbreeding and reduced genetic diversity; this reduces germination success and fitness within populations, and leaves them vulnerable to the impacts of disease, climate change and disturbance. Invasive plants, inappropriate fire regimes, and browsing by native and feral herbivores places additional pressure on the survival of this species (NSW OEH 2012).

Young (2001) identified genetic erosion and inbreeding as a major threat facing small populations of this species. This is due, in part, to the Small Purple Pea being an autotetraploid species that is potentially self-compatible. This results in a reduction in fitness and reproductive capability, and can impact germination success, growth rates (including maximum plant weight), disease resistance, and increased accumulation of deleterious mutations (Buza et al. 2000, Young 2001).

CHANGING CLIMATE

A range of indirect impacts resulting from a changing climate may threaten the persistence of the species at some sites, these include increased drought conditions, changes in plant species composition (including invasive species), and fire frequency and intensity.

A lack of connectivity and genetic diversity within populations is likely to reduce the resilience of the species to the impacts of climate change.

CONSERVATION ISSUES AND INTENDED MANAGEMENT ACTIONS

PROTECTION

A critical element in the conservation of the Small Purple Pea is the conservation of lowland grassy woodlands, including the endangered *Yellow Box-Blakely's Red Gum Grassy Woodland* under the *Nature Conservation Act (2014)*. All extant populations in the ACT are protected within the ACT reserve system or are located on ACT land that is managed for conservation purposes.

ENVIRONMENTAL OFFSET REQUIREMENTS

Environmental offset requirements for species and ecological communities in the ACT are outlined in the ACT Environmental Offsets Policy and associated documents such as the ACT Environmental Offsets Assessment Methodology and the Significant Species Database. In the Assessment Methodology and Database, some of the threatened species have special offset requirements to ensure appropriate protection.

The Small Purple Pea has been determined to have a high risk of extinction in the event of further loss of habitat in the ACT. As such, offsets for this species are not appropriate.

SURVEY, MONITORING AND RESEARCH

Regular monitoring of Small Purple Pea populations by the ACT Government has improved knowledge regarding the ecology and population trends of the species. Projects have been undertaken to model the influences of climatic variables on flowering within the Mt Taylor population (Wilson et al. 2016).

The ACT Government partners with the ANBG to collect and bank the seed from various threatened plant species in the ACT, including the Small Purple Pea. There is approximately 3,400 Small Purple Pea seeds banked from populations in the ACT region. Due to the small size of ACT populations and the challenges in collecting viable seed, ongoing efforts to collect seed from ACT populations is a priority.

Survey for undiscovered populations of Small Purple Pea have previously occurred; continuing to undertake surveys to improve our understanding of the distribution of the species in the ACT is a priority. Other future monitoring and research projects should aim to improve knowledge of:

- the life history and ecology of the species, including its reproductive processes, plant and seed longevity and germination requirements
- how minimum winter temperatures affect the life history of the species
- how the frequency, seasonality and intensity of fire impacts the species and its habitat
- the genetic variation within and between Small Purple Pea populations and the genetic viability of the current seed bank
- how habitat fragmentation and reduced population size impacts genetic variability of the species
- the reliance on, and limitations of, appropriate pollinators
- the effect of future climate change scenarios on the frequency and severity of frost nights and the likely impact on flowering success

- the feasibility of translocating this species
- potential refugia sites for the Small Purple Pea under a changing climate
- suitable seed collection methods and methods for establishing new populations via translocation
- the links between the persistence and fluctuations in abundance of the species, and abiotic and biotic variables (including disturbance, predation, vegetation dominance and structure, and soil moisture, chemistry and temperatures).

MANAGEMENT

The Small Purple Pea persists as small, fragmented populations across the ACT that are at high risk of local extinction. Thus, the management priorities for the species is to maintain and enhance site condition and undertake translocation projects. Specifically, priority management actions include:

- continue annual monitoring of all known sites, including habitat condition assessments
- manage biomass through the use of fire, to maintain a heterogeneous habitat structure and diverse floristic composition
- control invasive plants that pose a threat to a population or site
- maintain an ex-situ population (seed bank and orchard)
- reduce the impacts of recreational activity, vehicle movement, trampling, soil disturbance and over grazing
- limiting information regarding the location of populations that is available to the public
- increase the size of existing populations and establish new populations through translocation.

All translocation projects undertaken must be consistent with the principles outlined in the Conservator Guidelines for the Translocation of Native Flora and Fauna in the ACT (ACT Government 2017) and the Guidelines for the Translocation of Threatened Plants in Australia (3rd Ed.) (Commander et al 2018).

IMPLEMENTATION

Implementation of this action plan requires:

- information identified in threatened species actions plans and other relevant documents to inform land planning and management on ACT Government Land
- allocation of adequate resources to undertake the actions specified in the strategy and action plans
- liaison with other jurisdictions (particularly NSW) with responsibility for the conservation of a threatened species or community
- collaboration with universities, CSIRO, ANBG and other research institutions to undertake research
- collaboration with non-government organisations such as Greening Australia to undertake on- ground actions
- collaboration with the community, where relevant, to assist with monitoring and other on- ground actions, and to help raise community awareness of conservation issues.

OBJECTIVES, ACTIONS AND INDICATORS

Table 1: Objectives, Actions and Indicators

OBJECTIVE	ACTION	INDICATOR
PROTECT		
1. Protect all populations from unintended impacts (unintended impacts are those not already considered through an environmental assessment or other statutory process).	1a. Apply formal measures to ensure all populations are protected from unintended impacts (including recreation, infrastructure works and other potentially damaging activities).	All populations are protected from unintended impacts by appropriate formal measures.
	1b. Encourage other jurisdictions to protect sites where the species occurs on their lands from unintended impacts	
	1c. Ensure protection measures require site management to conserve the species.	Protection measures include requirement for conservation management.
	1d. Identify other sites where the species occurs by maintaining alertness to the possible presence of the species while conducting vegetation surveys in suitable habitat.	Vegetation surveys in suitable habitat also aim to detect the species.
MAINTAIN		
2. Manage the species and its habitat to maintain the potential for evolutionary development in the wild.	2a. Monitor populations and the effects of management actions	Trends in abundance are known. Management actions are recorded.
	2b. Manage to conserve the species and its habitat.	Populations are stable or increasing. Habitat is managed appropriately (indicated by maintenance of an appropriate sward structure and herbage mass). Potential threats (e.g. weeds) are avoided or managed.
	2c. Maintain a database of sightings of the species, and if available, record habitat information.	Records of sightings are maintained and used to determine the distribution of the species in the ACT.
3. Reduce the impacts of genetic erosion on existing small populations	3a. Undertake genetic rescue on targeted small populations using plants sourced from genetically diverse populations.	Genetic rescue attempted at all small populations (<200 individuals).

OBJECTIVE	ACTION	INDICATOR
IMPROVE		
4. Enhance the long-term viability of populations through management of adjacent grassland/woodland to increase habitat area and connect populations.	4a. Manage grassland/woodland adjacent to the species' habitat to increase habitat area or habitat connectivity.	Grassland/woodland adjacent to or linking habitat is managed to improve suitability for the species (indicated by an appropriate sward structure and plant species composition).
	4b. Undertake or facilitate research and trials into techniques for increasing the population size.	Research trials have been undertaken to increase the size of the population. The population is stable or increasing.
5. Expand the range of the species in the ACT by providing suitable habitat and establishing new populations by translocation (upon advice from feasibility studies).	5a. Undertake or facilitate research and trials into establishing new populations.	Research and trials have been undertaken to establish new populations. New population(s) established.
6. Improved understanding of the species' ecology, habitat and threats.	6a. Undertake or facilitate research on habitat requirements, techniques to manage habitat, and aspects of ecology directly relevant to conservation of the species.	Research undertaken and reported and where appropriate applied to the conservation management of the species and Hall Cemetery Management Plan.
COLLABORATE		
7. Promote a greater awareness of, and strengthen stakeholder and community engagement in, the conservation of the species.	7a. Undertake or facilitate stakeholder and community engagement and awareness activities.	Engagement and awareness activities undertaken and reported.

ACKNOWLEDGMENTS

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